BUREAU OF STANDARDS
JUL 24 1928
LIBRARY

DEPARTMENT OF COMMERCE

# TECHNICAL NEWS BULLETIN
## OF THE BUREAU OF STANDARDS

Subscription, 25 cents a year (U. S.), 40 cents a year (Foreign). Address "Superintendent of Documents, Washington, D. C."

Washington. July, 1928—No. 135

CONTENTS

Future international basis for electrical units.
Radio fading in the broadcast range.
Fire exposure conditions in masonry-walled buildings having combustible interior construction.
Specifications for cotton rubber-lined fire hose.
Simplification for fire apparatus capacity approved.
Simplification of lift trucks and skid platforms approved.
Simplified ice cake sizes.
Commercial standard for clinical thermometers.
Standards for steel and genuine wrought iron pipe nipples.
Commercial standard for staple porcelain plumbing fixtures.
Tests of large concrete cylinders.
City planning and zoning.
Statistics and economics of building construction.
Meeting of paper-testing committee.
Uses of glue in the paper industry.
Testing procedure for destructive agents on deteriorated cotton textiles.
Chrome and vegetable tanned sheep leathers.
New and revised bureau publications issued during June, 1928.
Simplified methods of handling materials.
Mechanics' lien act committee.
Recent articles appearing in outside publications.

### FUTURE INTERNATIONAL BASIS FOR ELECTRICAL UNITS

By amendment to the International Convention on Weights and Measures it has been provided that electrical units and standards shall be dealt with through the organizations which have jurisdiction over the fundamental units of measurement. These organizations are the international general conference, the international committee, and the International Bureau of Weights and Measures. (See Technical News Bulletin No. 127, November, 1927.)

The seventh General Conference on Weights and Measures, held in 1927, approved the formation of a committee on electricity to advise the permanent International Committee on Weights and Measures on questions relating to electrical standards and systems of measurement. This advisory committee was limited to 10 members, including a representative appointed by each of the national laboratories designated by the international committee and additional specialists named individually by that committee. It was provided that a member of the international committee should be chairman of the advisory committee and that a report should be rendered by it not later than March 1, 1929.

The national laboratories designated are the National Physical Laboratory of Great Britain, the Laboratoire Central

d'Electricité at Paris, the Physikalisch-Technische Reichsanstalt of Germany, the Central Chamber of Weights and Measures of the Union of Socialist Soviet Republics (Russia), the Electrotechnical Laboratory of the Department of Communications of Japan, and the National Bureau of Standards of the United States. Of the four additional members only two appointments have been announced. These are M. Chas.-Éd. Guillaume, Director of the International Bureau of Weights and Measures, and Prof. L. Lombardi, of Rome, Italy.

An American advisory committee has been formed to assist the Bureau of Standards in formulating proposals representing a consensus of the opinions held in this country. The organizations invited to take part and the representatives named as members of this committee are as follows:

National Academy of Sciences—Prof. A. E. Kennally.

American Institute of Electrical Engineers—Prof. A. E. Kennally.

American Physical Society—Prof. Henry Crew.

National Electrict Light Association—Dr. Clayton H. Sharp (alternate, A. B. Morgan).

Association of Edison Illuminating Companies—Dr. Clayton H. Sharp.

National Electrical Manufacturers Association—W. J. Canada.

American Telephone & Telegraph Co.—A. B. Clark.

The questions which these committees have before them may be considered as threefold, namely, (1) the relative functions of the international bureau and the several national laboratories in the future maintenance of the electrical units, (2) the particular values of the units to be adopted, (3) the methods to be used to assure the constancy of these units. These questions are, however, closely interrelated, and in particular the answers to the first two depend upon the last one.

The American advisory committee met at the Bureau of Standards on June 16, 1928, together with a number of members of the staff of the bureau. After due consideration of the information available regarding the present status of electrical measurements, the committee unanimously adopted the following resolutions:

"1. Resolved, that in the opinion of this committee, in view of improvements which are being made in absolute measurements, electrical standards should in future be based upon the absolute system of units.

"2. Resolved, that in the opinion of this committee the functions which it is desirable to have the International Bureau of Weights and Measures undertake in connection with the electrical units are as follows: (1) A central secretariat to arrange for systematic exchange of standards and compilation of results of intercomparisons thus made among the national laboratories. (2) A laboratory to which concrete standards representing the results obtained in the different countries may be brought for precise comparisons. (3) A repository for international reference and working standards with the necessary equipment so that other standards may be compared with these standards on request."

Resolutions of similar purport have been under consideration by committees of the American Institute of Electrical Engineers for some months, and were finally approved by the board of directors during the Denver meeting, June 25 to 29, 1928. The official text of these resolutions has not been published, but it is understood that it is in print as follows:

"Whereas there is conclusive evidence that there are discrepancies between the statutorily established international electrical units (ohm, ampere, and volt) and the fundamental ohm, ampere, and volt which the international units were intended to represent, these discrepancies in the case of the ohm and the volt amounting to approximately one-twentieth of 1 per cent; and

"Whereas differences of this magnitude are objectionably large in comparison with the precision required and now being attained in the construction and

use of standards fundamental to all electrical measurements: Therefore be it

"Resolved, That the American Institute of Electrical Engineers hereby urges the Bureau of Standards and foreign national standardizing laboratories to undertake, as soon as possible, the additional researches necessary in order that legislation to reduce these discrepancies to within acceptable limits may be enacted in the near future, and

"Whereas the present electrical units are defined by statute in terms of material standards, namely, the mercury ohm and the silver voltameter, which it is now known only approximately represent the absolute ohm and ampere and which experience has shown to have serious limitations, and

"Whereas such progress has been made in recent years in the art of making absolute electrical measurements in terms of the fundamental units of length, mass, time, and space permeability that the accuracy and reproducibility of a system of electrical units realized by such absolute measurements would seem to be adequate for commercial, industrial, and scientific purposes; and

"Whereas the legalization of the absolute ohm and ampere and the units derived from them (these units to be realized by the national standardizing laboratories) would avert the recurring proposals for revision of the values of the legalized units, and would establish the electrical units on a permanent legal basis: Therefore be it

"Resolved, That the American Institute of Electrical Engineers hereby urges the Bureau of Standards and foreign national standardizing laboratories to undertake as soon as possible the additional researches necessary in order that the absolute ohm and absolute ampere based on the absolute volt, watt, and other units derived from them, may be legalized in place of the international ohm and ampere and their derived units.

"Resolved further, That in order to avoid the confusion which would result from an interim use of new empirical units based on corrected values of the international units, the international electrical units should be continued in effect without any readjustment of values until such time as the practicability of legalizing the above-mentioned absolute units shall have been determined."

Even after national standardizing laboratories were established these arbitrary primary standards were considered the most practical basis for defining the units and for checking from time to time the values maintained by resistance coils and standard cells. Developments during the last 20 years have, however, changed the situation materially. In the first place, the standards used purely for maintenance purposes have proved surprisingly dependable; in the second place, all scientific workers have come to depend upon the great national laboratories to supply certified standards, so that no other laboratory expects to set up independent reference standards; and finally, the experience gained in electrical measurements, together with the refinements made in electrical theory have apparently made it possible to determine absolute values for the ohm and ampere with an accuracy not less than that attained in reproducing the international units by the prescribed arbitrary primary standards.

The excellent performance of the modern wire resistance coil and standard cell makes it possible to maintain the units for many years with a certainty greater than the values can be reproduced by any single method. In actual practice whenever mercury ohm determinations have been made during the last 20 years the results have been considered as agreeing with the wire standards within the limits of accuracy attainable by the mercury tubes, and "the values assigned to the wire standards have not been changed." Similarly, the second unit actually maintained throughout that period has been the volt, represented by the standard cell; in fact, no final agreement has ever been reached on the precise specifications for the silver voltameter to represent the second international unit.

The logical conclusion seems to be to recognize the fact that the nominally

accepted international system of reproducing the units has not worked in actual practice but that out of experience there has developed a better system. This consists of highly dependable maintenance standards which will serve to maintain continuity and uniformity of values, these values being subject to change by international agreement only when the accumulated evidence of repeated determinations by all available experimental methods shows that there has been a drift or that the values assigned to the working standards are not exactly what they should be.

Looking forward to the need for the most accurate possible values of the electric units in the absolute system, the Bureau of Standards inaugurated some years ago a program of research in this field. This program is now being pushed forward more rapidly, and, although as a whole it must extend over many years, it is hoped that some preliminary results will be at hand before the report of the international advisory committee is due in March, 1929. In the meantime, the opinions of American technical societies, as recorded in the resolution quoted above, are being put before the international advisory committee. Representing as they do the unanimous action of the organization concerned, these recommendations should have great weight, and the position of this country in these international relationships is correspondingly strengthened by this complete understanding and hearty cooperation between governmental agencies and the scientific, industrial, and commercial organizations intrusted in the problem.

## RADIO FADING IN THE BROADCAST RANGE

For the past several months an investigation has been conducted by the Bureau of Standards to determine the factors contributing to the phenomenon known as fading. Special apparatus utilized in conjunction with radio receiving sets makes it possible to secure graphic records of the increase and decrease of signal strength, such as commonly experienced when listening to programs from distant stations at night. This apparatus, sufficiently sensitive to indicate variations smaller than the ear can detect, was used with receiving systems employing different types of antennas to analyze the manner in which the waves transmitted from a broadcasting antenna arrive at the receiving antenna.

The factors which may cause variations in the intensity of radio waves are complex, and a critical study of fading has suggested explanations of some of these factors.

Graphic records of a single selected transmission were made using identical receiving sets except for the antennas. The antenna systems used in the course of the invetigation were (1) vertical antenna, (2) coil antenna directed toward the station being received, (3) coil antenna with planes at right angles to the direction of the transmission path, (4) combination of coil antenna and vertical antenna connected in such a way as to eliminate waves received directly from the station. Simultaneous records were made using two receiving sets with different types of antennas.

Examination of data from simultaneous measurements made with a coil antenna in maximum position and with a vertical antenna, respectively, indicated that for stations 165 to 1,500 km distant the same sort of fading occurred simultaneously in both antennas, but that for stations 13 to 53 km distant similar fading characteristics did not occur simultaneously.

Records made with coil antennas at maximum and minimum positions showed that for a station 300 km distant, for instance, there are considerable periods in which an increase of intensity in one antenna is accompanied by a decrease in the other. Often a relatively rapid and periodic fluctuation of small magnitude is found superposed on the longer period trend of the records. It was found that, for one station at least, this superposed, rapid fading of periodic type occurs with considerable regularity directly after sun-

set, and lasts for approximately a half hour.

The results may be interpreted to mean that the waves do not reach the receiving antenna in the same position relative to antenna in which they start—that is, their plane of polarization is changed. This change only takes place when the wave has been reflected. Several reflections from different points may take place, resulting in there being at the receiving stations two or more waves which started at the same time from the transmitting station and traveled very different paths before reaching the receiving station.

More detail concerning these phenomena will be given in a paper to be published at a later date. Notice of this publication will be given in the Technical News Bulletin.

## FIRE-EXPOSURE CONDITIONS IN MASONRY-WALLED BUILDINGS HAVING COMBUSTIBLE INTERIOR CONSTRUCTION

Buildings of this class constitute a majority of the business structures in our towns and cities. The masonry walls afford protection to the building in case of fire in neighboring buildings, particularly with protected wall openings, and again they decrease the hazard to the surroundings when the given building burns, although freedom from collapse of inclosing walls not supported on adjacent construction can not be premised after the interior floor construction has fallen.

The severity of fires in buildings of this type is of interest mainly as it concerns exposure to the surrounding buildings, to party and fire walls, and to protected containers located within the building, such as insulated safes and vaults. Previous tests made at the Bureau of Standards to obtain information on the severity of building fires have simulated conditions in buildings having fire resistive interior as well as exterior construction that will withstand a complete burning out of combustible contents and trim without collapse of major structural members, such as walls, floors, columns, and roof. Items relative to these tests have been given previously in this bulletin and the first technical paper giving the results with office and record storage occupancies has been published (Proceedings Fourteenth Annual Meeting of the Building Officials' Conference, 1928; and Quarterly of the National Fire Protection Association, Vol. 22, No. 1; July, 1928). This interprets the results of burning-out tests in rooms having fire resistive inclosures and combustible contents from 13.1 to 55.4 lbs./ft.$^2$ of floor area (105,000 to 440,000 B. t. u. per square foot) assumed uniformly distributed, in terms of hours of equivalent fire exposure in the standard furnace test used to rate the fire resistance of building materials, constructions, and devices.

In case of fires in buildings with combustible interior construction there is an initial period of fire exposure before floor and roof construction collapses, the severity of which is measurable by the same means and in the same terms as that of fires in fire-resistive buildings. Beyond the point of collapse of floors, roof, column, and wall constructions, the air temperatures, except immediately above the débris, go down to points presenting little hazard. The temperature in the débris continues, however, at higher points for long periods, and is of interest as it concerns exposure to safes, vaults, and party and fire walls that may be covered, partly covered, or in contact with it. Temperatures measured in the débris from heavy furniture and high-loaded shelves in the tests previously referred to indicated a more severe condition than that of the fire exposure above it, although the piles were not as high as would be expected from the collapse of several floors of a non-fire-resistive building. In building fires it is recognized that the most severe exposure for insulated safes and vaults is the prolonged heating in the ruins where water is not applied.

The lack of information on what is the severity of exposure under such fire conditions led to request that the bureau include tests with such buildings in its work on intensity and duration of

building fires. This matter was of particular interest to the Committee on Protection of Records of the National Fire Protection Association, as a basis for assigning suitable degrees of protection for records in buildings of given heights and combustible contents. The opportunity for conducting a test of this kind presented itself in connection with the Government building program in Washington that involved the razing of buildings on several squares. Two adjoining buildings, previously housing mercantile occupancies, one two stories and 20 feet wide, the other five stories and 30 feet wide, both 75 feet long, were placed at the bureau's disposal through the courtesy of the Treasury Department. These buildings had brick walls and open wood-joisted floor and roof construction, the floors being of 1-inch boards on 3-inch thick joists. Both buildings had open stair and elevator shafts, very few partitions, and generally presented conditions favorable for rapid spread of fire.

The buildings were loaded with waste lumber to give superimposed load of combustibles of 7½, 15, and 30 lbs./ft.$^2$ of floor area for the front, middle, and rear 25-foot sections, respectively, of all floors of the two buildings. Thirty-two insulated safes were located on the various floors, mostly along the walls. Most of them were donated by manufacturers and represented degrees of fire resistance from less than one hour to fully four hours of fire resistance as exposed in the standard furnace test. Five old safes were also included, three of which were supplied by the Post Office Department. Each safe was loaded with paper, and in each was also placed maximum indicating thermometers. In all safes above the ground floor was also placed an alarm clock fitted with a trigger that would stop the clock movement when the position of the safe was disturbed, this being intended to indicate the time the safes dropped because of collapse of the supporting floor. About 50 thermocouples were inserted through the outside walls a few feet above the different floors and a similar number extended from hollow posts erected and anchored into the concrete floor slab near the ground level of both buildings. These thermocouples connected with an instrument room 100 feet to the rear of the buildings. The rest of the buildings in the square as well as in the adjoining square on one side had been razed at the time of the test, the nearest building being approximately 200 feet away. To decrease the hazard to the surroundings, the side walls of the higher building were trussed together with rods above the roof line to delay the collapse of the walls, and new sheet steel roofing was placed over the old roofing to aid in holding down the volume of flame, hot gases, and brands that might escape during the height of the fire. At a conference held immediately before the test with safe manufacturers and others interested, it was decided to continue this test to the point of cooling down of ruins without the application of water.

Fires were started at several points on the ground floor of both buildings at nearly the same time early on the morning of June 17, the time being chosen to avoid interference with the usual activities of the district in which the buildings were located. The day was clear, with little or no wind. The fire spread rapidly up through the open stair and elevator shafts, and within 10 minutes nearly all portions of the two buildings were involved. In the course of 15 to 20 minutes the wooden floor joists began to burn through, followed by falling of safes. The greater number of safes fell in the period between 23 and 38 minutes. When the fire had been burning 28 minutes a section of the front wall of the larger building fell out. Portions of the other walls fell at intervals thereafter, until at the end of the first hour the greater portion of the walls above the first story in the small building and above the second story in the other building had collapsed. When the side walls of the five-story building fell out, the falling brickwork blanketed the two-story

structure and produced a prolonged heat exposure for the buried safes. After one and one-half or two hours it could be said that the buildings were burned down, but in the larger building there remained a large mass of débris that continued to flame for many hours.

The test involved a large amount of work in preparation, and observation during and after test. A complete report based on a full reduction of temperature and other data can not be given at this time. However, it can be stated that the temperature rise during the initial portion of the test was more rapid than in the standard furnace test, 2,000° F. obtaining at several points within 20 minutes, and maximums between 2,200° and 2,400° F. at a few points within 40 minutes. After collapse of floor and roof constructions the air temperatures fell rapidly except at points immediately above the burning débris. The exposure in the ruins was more prolonged although less intense. Temperatures high enough to be prejudicial to the fire safety of the contents of safes obtained in different portions of the ruins for periods from a few hours to three days. The severity of the exposure to different safes varied greatly even in places where the safes were within a few feet of each other in the ruins. The test should, therefore, not be regarded as being in any sense a comparative fire test of safes, but rather one to determine the fire exposure conditions for such devices. It is expected that the test will yield data among others on the following points:

1. The rapidity of spread of fire in open-joisted buildings of the type tested.

2. The rate of temperature rise and maximums obtaining before the interior construction collapsed, as measured by the thermocouples within mountings of size comparable with those employed for furnace - temperature measurements in fire tests.

3. The extent to which the rapid temperature rise produced explosive openings of safes, as has been experienced in some fires.

4. The time the safes dropped, this to be considered in comparison with the one-half-hour or one-hour duration of fire test before impact drop in the standard procedure for testing safes.

5. The effect of the drop on the safe structure, and also the effect of impact from falling brick walls and similar heavy objects, this to be considered in comparison with the effect of the 30-foot drop on brick riprap in the specification test for safes.

6. The effect on safe and contents of being covered, partly covered, or in contact with the hot débris after the fire.

7. The percentage of safes involved that were fully covered, partly covered, in contact with, or clear of the hot débris.

8. Air temperatures above the débris, this having a bearing on exposure to safes and to party and fire walls.

9. Temperature in the débris until cooling down—a matter of several days.

10. Effect of the fire in producing collapse of building details, such as inclosing walls and metal roof covering, the protection afforded neighboring buildings by these details, and general hazard to surroundings created by the fire.

It might be added that the test created little hazard to the surrounding buildings with the weather conditions present. The temperature on the exposed wall of a temporary wooden shed located 110 feet from the burning buildings in a position to receive the maximum effect from radiated heat was apparently well below the ignition point for wood. The column of hot gases rose in such manner as to easily clear all surrounding buildings in its path. The only building that it might have affected was the Post Office Department Building, whose tower is of considerable height. However, the mild breeze present bore the column in a different direction. The test was marked by almost total absence of brand production. This might be owing to the general character of the contents, consisting as they did of no lighter material than 1-inch boards, as well as to the absence of wind. The steel roofing in

the buildings functioned acceptably in the period 15 to 30 minutes in forcing exit of the hot gases mainly through the window openings, thus preventing a decided chimney effect. The tie rods through the side walls above the roof line apparently delayed major collapse of walls until the fire was a little past maximum intensity, when their fastenings pulled through the masonry. All walls fell outward, caused by expansion near the inner surface from the fire. A similar effect has been observed in fire tests of unrestrained walls, although with 12-inch thick walls 11 feet high, or 8-inch walls of similar height stiffened with pilasters 8 inches thick, the deflections developed were not large enough to cause collapse.

## SPECIFICATIONS FOR COTTON RUBBER-LINED FIRE HOSE

The sectional committee of the American Engineering Standards Committee, representing 12 important interests, has adopted by a substantially unanimous ballot the proposed specifications for cotton rubber-lined fire hose. This important step in the unification of standards practically completes the work of the sectional committee which was organized in November, 1926, and sponsored by the American Engineering Standards Committee's fire protection group.

The specifications are now before the sponsors for approval.

## SIMPLIFICATION FOR FIRE APPARATUS CAPACITY APPROVED

A tentative simplification for fire engine pumping capacities was approved on June 27 by a general conference of manufacturers and users under the auspices of the division of simplified practice.

The recommendation approved 300, 400, 750, and 1,000 gallons per minute at 180 pounds pressure. However, the first two capacities, or any other capacities less than 500 gallons per minute, are not recognized as standard by the National Board of Fire Underwriters. In this connection the following resolution was passed by the conference: "The conference goes on record as indorsing the paragraph contained in the suggested specifications for gasoline automobile fire apparatus of the National Board of Fire Underwriters, dealing with the 300 to 400 gallon capacity." This paragraph reads:

"These machines are within the reach, financially, of villages and rural districts which otherwise could not buy equipment; they are more generally effective than the usual chemical engine in territories without waterworks system, as some suction supply usually can be found. It must be recognized, however, that in some States little or no credit is allowed by the insurance rating organization for pumping capacity of less than 500 gallons a minute in one or two pumpers."

On account of the relatively small number of fire engines produced annually as compared with other manufactured products in the mechanical line, there has been a natural tendency toward diversification, in an effort to meet exactly the requirements of users. Manufacturers and users have recognized the fact that unnecessary diversity of size or capacity results in increased cost and slower service and makes it difficult to manufacture parts for stock.

Approximately six months ago a number of manufacturers cooperated to obtain figures in regard to existing diversity, and after several preliminary meetings a committee of the manufacturers formulated the list of standard capacities, which was approved as being sufficient to adequately cover all reasonable demand for stock fire engines.

This recommendation will become effective on October 1, 1928, subject to annual review by the standing committee. This committee will consist of Charles H. Meigs, commissioner of the Fire Equipment Institute; George S. Watson, chief, District of Columbia Fire Department; Ross B. Davis, president of the International Association of Fire Departments; S. O. Cook, of the Boyer Fire Apparatus Co.; and D. C. Fenner, of the Mack International Truck Corporation.

## SIMPLIFICATION FOR LIFT TRUCKS AND SKID PLATFORMS APPROVED

A proposed simplified practice recommendation for the dimensions of lift trucks and skid platforms has been approved by a general conference of manufacturers and users under the auspices of the division of simplified practice.

The conference passed resolutions that two standard dimensions, 8 and 12 inches, be adopted for underclearance of skid platforms and that "the minimum clearance between runners or supports of skids be not less than 29 inches." In addition, the conference went on record as favoring the establishment of standard dimensions for over-all length and width of skid platforms, with the proviso that there be two standards, one to be such that this size of skid can be placed three abreast in a freight car, and the other the same length as the first skid but twice the width.

The conference agreed on a standard terminology for skid platforms as follows: Skid platforms—a platform of given size which is mounted on skids or legs and which can be easily moved from place to place. Skid stock boxes—a platform of given size, which has closed sides and ends forming the shape of a box, and which is mounted on skids or legs so that the same can be easily moved from place to place. Hand lift truck—a 3 or 4 wheel truck, the upper platform of which is adjustable to different heights, this adjustment being made by hand and the truck propelled by hand power. Power lift truck—a 3, 4, or 6 wheel truck, the platform of which is raised or lowered by power, and the truck and load it carries propelled by power.

This recommendation, subject to acceptance on the part of the interested elements of the industry, will become effective October 1, 1928. It will be reviewed annually by the standing committee. The membership of this committee is comprised of Robert A. Lesher (chairman); J. W. Meddick, of the Lakewood Engineering Co.; Walter C. Stuebing, of the Stuebing Cowan Co.; and Edwards L. Leeds, of Leeds & Co.

## SIMPLIFIED ICE CAKE SIZES

A general conference on June 12 at the Department of Commerce of manufacturers, distributors, and users adopted a simplified practice recommendation for weights and dimensions of ice cakes.

The following weights of ice cakes were approved as standard for the industry: 25, 50, 75, 100, and 150 pounds. In the case of each of the standard weights mentioned, no single dimension of any ice cake shall exceed the following:

| Weights (in pounds) | Size | | |
|---|---|---|---|
| | *Inches* | *Inches* | *Inches* |
| 25 | 12 | 12 | 8 |
| 50 | 12 | 12 | 16 |
| 75 | 12 | 12 | 24 |
| 100 | 12 | 16 | 24 |
| 150 | 12 | 24 | 24 |

The simplified practice committee of the industry was requested to include in the report of this conference, which will be sent to the industry, a tabulation of the principal dimensions of ice cuts now used in various parts of the United States, for the guidance of manufacturers of ice boxes and others interested, and for comparison with the mentioned list of limiting dimensions.

It was the opinion of the conference that the effort now under way to establish exact standards of dimension for ice cakes and ice cuts be indorsed and encouraged and that in the furtherance of this work an effort be made to simplify the existing range of sizes by reducing them to as small a number as possible.

Organizations interested in this simplification, and who were represented at the conference, included the following: American Society of Refrigerating Engineers; Gurney Refrigerating Co.; Keystone Refrigerating Corporation; American Home Economics Association; Challenge Refrigerator Co.; American Institute of Refrigeration; National Association of Ice Industries; Kelvinator Cor-

poration; Leonard Refrigerator Co.; and the Bureau of Home Economics, of the Department of Agriculture.

## COMMERCIAL STANDARD FOR CLINICAL THERMOMETERS

Written acceptances, representing at least 65 per cent of production by volume and a majority of distributors and organized users, having been received by the commercial standards unit of the Bureau of Standards, announcement has been made by the bureau that the commercial standard for clinical thermometers will become effective for the industry on October 1, 1928.

This standard was formally approved by a general conference of manufacturers, distributors, and organized users, held March 30, 1928. The conference at that time agreed that production of new thermometers under this standard would begin October 1, 1928, and that one year (March 30, 1929) would be allowed for clearance of existing manufacturers' stocks. Annual revision of the standard was provided for through the appointment of a standing committee, representative of the entire industry.

The industry also authorized the promotion of foreign commerce in this commodity, which will be manufactured under provisions of the standard. It will be first translated into Spanish and Portuguese.

At the time the conference was held manufacturers present stated that the industry was determined to market only accurate and reliable clinical thermometers, and to this end each thermometer would be certified by the manufacturer to the purchaser as complying in all respects with the requirements and tests required by the approved commercial standard adopted.

## STANDARDS FOR STEEL AND GENUINE WROUGHT IRON PIPE NIPPLES

A general conference of manufacturers of pipe and pipe nipples, distributors and users of pipe nipples, held June 29, at the Department of Commerce, approved commercial standards for steel and genuine wrought iron pipe nipples.

The approved commercial standards specify that pipe nipples shall be made only from tested new full or short lengths and full weight steel pipe, free from buckles, bends, kinks, cracks, laminations, imperfect welds, rust, injurious sand marks, or any other defects which might affect its strength or serviceability.

For steel pipe nipples, the pipe shall otherwise conform in all respects with the tentative specification for welded and seamless steel pipe of the American Society for Testing Materials, while that for genuine wrought iron pipe nipples shall be in accordance with A. S. T. M. specification for welded wrought iron pipe No. A72–27.

The conference agreed that the effective date for new production and clearance of existing stocks should be January 1, 1929. The commercial standards will be subject to annual review for revision by the standing committees. These committees, appointed by the general conference, are as follows: Standing Committee for Steel Pipe Nipples—Raymond Groff, of the Pipe Nipple Standards Corporation; and representatives yet to be appointed by the Crane Co., Walworth & Co.; Association of American Steel Manufacturers, James A. Messer Co., Central Supply Association, American Association of Heating and Ventilating Engineers, James B. Clow & Sons, National Association of Master Plumbers, and Standard Sanitary Manufacturing Co. Standing Committee for Genuine Wrought Iron Pipe—Raymond Groff, of the Pipe Nipple Standards Corporation; C. T. Resslor, of the Reading Iron Co.; James Aston, of the A. M. Byers Co.; and representatives to be appointed from the James A. Messer Co., Central Supply Association, American Association of Heating and Ventilating Engineers, James B. Clow & Sons, National Association of Master Plumbers, and Standard Sanitary Manufacturing Co.

The conference voted unanimously for the adoption of the certification plan of the Bureau of Standards. Under this

procedure the manufacturer of the nipples will, upon request, certify to the purchaser that his commodity is made in conformity with the approved commercial standards.

I. J. Fairchild, head of the commercial standards unit, stated that before printing the standard signed acceptances must be received from at least 65 per cent of annual production by volume, as well as a majority of distributors and users. The interested elements of the industry will shortly be circularized for this signed acceptance.

When the proper number of acceptances have been received, the commercial standards will be published by the bureau.

## COMMERCIAL STANDARD FOR STAPLE PORCELAIN PLUMBING FIXTURES

A general conference of representative manufacturers and users of staple porcelain (all clay) plumbing fixtures, held on June 12 at the Department of Commerce, adopted a commercial standard for this commodity.

The project defined standard nomenclature, definitions, grading rules, types, sizes, dimensions, and general practices for the industry. Types and sizes of urinals, sinks, laundry trays, lavatories, receptors, and baths not specifically mentioned in the standard will be considered by the industry as "specials."

The conference set July 1, 1929, as the effective date to start new production of the commodity in conformity with the adopted commercial standard. January 1, 1930, was agreed upon as the date for clearance of existing stocks. This allows six months from the start of new production to use up old stock. It was also voted that the standard should be reviewed annually in order to provide for any revision or modification that the industry may consider necessary in order to keep the standard abreast of modern current practices.

I. J. Fairchild, of the commercial standards unit, Bureau of Standards, explained the certification plan that has been developed by the bureau. Under this plan the bureau prepares a list of the manufacturers who are willing to certify to the purchaser that the commodity is made in accordance with the adopted commercial standard. The conference voted to accept this plan.

M. H. Bletz, of the Bureau of Foreign and Domestic Commerce, stated that the value of total exports of plumbing fixtures from the United States in 1927 was about two and a half million dollars. The conference voted to refer the matter of translation of the commercial standard into Spanish to the advisory committee on porcelain (all clay) plumbing fixtures for further study and recommendation.

The conference authorized the appointment of a standing committee, which will be charged with the responsibility of promulgating the standard and caring for the annual revision. The members of this committee are George E. Hoffman, of the Trenton Potteries Co., chairman; George H. Drake, of the National Association of Master Plumbers; Abel Hansen, of the Fords Porcelain Works; LeRoy E. Kern, of the American Institute of Architects; R. T. Rock, of the National Association of Master Plumbers; W. J. Spillane, of James B. Clow & Sons; Benjamin Cadbury, of the Hajoca Corporation; George Kumpf, of the Dimmick Fink Co.; and C. W. Fell, of the W. A. Case & Son; and I. J. Fairchild, of the Bureau of Standards.

The commercial standards group will shortly circularize the manufacturers, distributors, and organized users for written acceptances to the standard. Before it can be published by the Department of Commerce, acceptances representing at least 65 per cent of production by volume and a majority of distributors and organized users must be received by the department.

## TESTS OF LARGE CONCRETE CYLINDERS

The data on the test of the group of concrete cylinders described in Technical News Bulletin Nos. 129 and 133 have been carefully analyzed, resulting in some interesting developments. It

may be recalled that the cylinders were in the proportion of height equal to twice the diameter, the sizes being 2, 3, 6, 12, 18, 24, and 36 inches in diameter.

Comparison of test results readily showed that in general, throughout the tests for any batch, the larger the diameter of the cylinder the lower the strength. The several factors influencing the strength were studied. These were fabricating methods, curing conditions, testing-machine speed, proportions, and water-cement ratio. The 2 and 3 inch cylinders were made by one method, the 6 and 8 inch by another, the 12 and 18 inch by another, which was slightly modified when applied to the 24 and 36 inch cylinders. It was found that for cylinders of different size and made of the same proportions, and by the same fabricating and curing methods, the strength was practically the same, and conversely every change in strength was accompanied by a change in fabricating method or a change in mix. As one example, the average strength of the 2-inch cylinders differed from the average strength of the 3-inch cylinders, which were of the same material and made in the same manner, by only one-fourth of 1 per cent. The difference in cylinder size was therefore shown not to be responsible for the change in strength.

The rate of deformation of the cylinders varied considerably with the size of specimen, due mainly to the different specimen heights, coupled with the standard head speed. The rate of deformation of the 6-inch cylinders was approximately the rate of the 24-inch cylinders, yet the 6-inch cylinder strength was in each case markedly higher than the strength of the 24-inch cylinders, eliminating the difference in rate of testing deformation as the cause of the strength difference.

Due to the difference in strength of cylinders made from purportedly duplicate batches, the influence of increasing the size of the aggregate in the mix was not unconditionally determined. The best indications from the tests, however, are that the maximum strength is attained under the fabricating conditions of this group of test cylinders, with aggregate of maximum size of about 2 inches, the strength falling off with increase in size of aggregate. The strength with 10-inch aggregate is approximately 20 per cent less than for 2-inch aggregate. The loss in strength may be reasonably allocated to the difficulty of causing the larger aggregate to be interlaid in the minimum volume, or with a minimum of voids.

## CITY PLANNING AND ZONING

In the last published report of the bureau on zoning (Survey of Zoning Laws and Ordinances in 1927, issued in March of this year) it was reported that 583 cities and towns have zoning ordinances in effect. In order to keep up to date the bureau lists of zoned municipalities and of cities and towns having planning boards or commissions, the division of building and housing has been engaged during the last two months in conducting, by means of questionnaires, a survey of zoning and city planning activities. While insufficient time has elapsed for all of the returns to be received and tabulated, it now appears that the final results of this survey will show a material increase in the number of zoned municipalities, as over 600 cities and towns have thus far reported zoning ordinances adopted.

In the bureau's list city planning report (Survey of City Planning and Related Laws in 1927, issued in March, 1928) it was stated that city planning commissions or boards were known to exist in at least 244 cities and towns of less than 28,000 population. The present survey indicates that this number will be raised to over 300. These are in addition to the 206 city planning commissions recorded as having been established in the 267 largest cities of the country (over 25,000 population, 1920 census).

## STATISTICS AND ECONOMICS OF BUILDING CONSTRUCTION

The value of construction contracts awarded in 36 Eastern States during the month of May, 1928, as reported by the F. W. Dodge Corporation, amounted to $641,394,800, and represented an increase of 21 and 23 per cent in comparison with May, 1927 and 1926, respectively. This high level of awards not only established a new record for the month of May, but also exceeded that of any other month on record.

There were increases of 37 per cent each for public works and public utilities, and educational buildings, 32 per cent in residential building, and 26 per cent in commercial building. There was also an increase in military and naval construction, which is a relatively unimportant group. The value of contracts for all other classes of construction was less than during May, 1927, the decrease of 26 per cent in industrial construction being the greatest actual value.

## MEETING OF PAPER-TESTING COMMITTEE

A meeting of the paper-testing committee of the Technical Association of the Pulp and Paper Industry was held at the bureau June 14. The meeting was conducted by B. W. Scribner, chairman. Plans were made for further development of official association methods. The committee has so far completed 26 paper-testing methods which cover the common physical and chemical tests. The new work planned consists of methods dealing with resistance to liquids, such as waterproofness, degree of sizing and grease resistance, and various chemical methods.

The procedure for development and adoption of these official association methods, and their form, are practically the same as those of the American Society for Testing Materials. The paper-testing committee is composed of 33 paper technicians, representative of manufacturers, consumers, and commercial and Government paper laboratories.

## USES OF GLUE IN THE PAPER INDUSTRY

A handbook on the above subject, recently published by the Glue Research Corporation, contains a summary of the information gathered during the investigation of the uses of glue in the paper industry, by the research fellowship of the National Association of Glue Manufacturers at the Bureau of Standards. This was prepared by G. K. Hamill, research associate of the glue association, who conducted the work.

The publication contains an outline of paper-making processes in general, information on uses of glue in beater sizing, surface sizing and coating, and a bibliography of publications dealing with these subjects.

Copies may be obtained from the Glue Research Corporation, 1457 Broadway, New York, N. Y.

## TESTING PROCEDURE FOR DESTRUCTIVE AGENTS ON DETERIORATED COTTON TEXTILES

Deteriorated textile fabrics and yarns frequently present a very difficult problem to the textile chemist. This is especially so in the case of laundry materials where often accumulative deterioration occurs and the destructive agent is almost entirely removed by the laundry process. The problem then is the detection, identification, and estimation of chemicals of microscopic size.

The technical literature discloses that general methods are available for the most likely destructive agents. Other methods dealing more specifically with textiles are to be found in technical and trade publications in the textile field.

In connection with a study of deteriorated textiles it was necessary to formulate a procedure for estimating the maximum number of possible destructive agents with a minimum of samples available.

This procedure covers the analysis of a deteriorated cotton textile fabric for total silica, iron, aluminum, sulphates, total acidity, oxalates, soluble sulphates, soluble chlorides, and combined chlorides.

## CHROME AND VEGETABLE TANNED SHEEP LEATHERS

In connection with studies of the properties of leather, six sheepskins were prepared by a tanner for the purpose of noting the effect of chrome and vegetable tanning processes on the strength and stretch of these leathers. Each skin was split down the back and one side of each skin was tanned by the vegetable process while the remaining sides were tanned by the chrome process. Each side of leather was cut into strips 1 by 6 inches, each of which was tested for strength and stretch. The results are listed below.

| Sample [1] | Tannage [2] | Average thickness | Stretch at— | | Tensile strength | Direction [3] |
|---|---|---|---|---|---|---|
| | | | 1,000 pounds per square inch | Failure | | |
| | | *Inches* | *Per cent* | *Per cent* | *Lbs./in.²* | |
| 1 | C | 0.035 | ------ | 47.0 | 2,915 | L |
| 4 | C | .038 | ------ | 42.0 | 3,440 | L |
| 5 | C | .034 | 25.5 | 43.8 | 2,440 | L |
| 1A | V | .037 | ------ | 37.2 | 3,325 | L |
| 4A | V | .044 | ------ | 36.5 | 4,125 | L |
| 5A | V | 038 | 18.2 | 35.3 | 2,995 | L |
| 2 | C | .039 | 64.7 | 90.2 | 2,305 | C |
| 3 | C | .030 | ------ | 90.0 | 2,120 | C |
| 6 | C | .029 | ------ | 80.7 | 1,595 | C |
| 2A | V | .038 | 61.4 | 85.8 | 2,355 | C |
| 3A | V | .036 | ------ | 76.5 | 2,515 | C |
| 6A | V | .031 | ------ | 87.3 | 1,755 | C |
| SUMMARY | | | | | | |
| 1A–4A–5A | V | 0.040 | ------ | 36.3 | 3,495 | L |
| 2A–3A–6A | V | .035 | ------ | 82.9 | 2,280 | C |
| 1–4–5 | C | .036 | ------ | 44.3 | 2,900 | L |
| 2–3–6 | C | .032 | ------ | 86.8 | 1,995 | C |

[1] 1 and 1A, 2 and 2A, etc., sides of the same skin.
[2] C, chrome; V, vegetable.
[3] Direction of cutting test pieces: L, lengthwise; C, crosswise.

It will be noted that the sheep leather is much stronger in the lengthwise direction than in the crosswise direction regardless of the type of tannage and that the percentage of stretch is approximately double in the crosswise direction. The finishing methods may have an influence on these properties. The vegetable tanned leathers are stronger and stretch less than the chrome tanned leathers.

## SIMPLIFIED METHODS OF HANDLING MATERIALS

A meeting of shippers, carriers, and warehousemen, held June 6, 1928, under the joint auspices of the Bureau of Foreign and Domestic Commerce and Bureau of Standards, approved the proposed program covering simplified methods of handling materials.

The conference was called for the purpose of considering the use and extension through cooperative effort of simplified methods of handling, moving, loading, and unloading goods; to promote the development of interchangeability in the equipment required for handling goods; and to promote the establishment of such dimensional standards as may be necessary to secure interchangeability of equipment.

Secretary Hoover addressed the meeting briefly, touching the cooperative functions of the Department of Commerce and the use that is made of its various services to the industry. He was followed by several divisional chiefs of the Bureau of Foreign and Domestic Commerce and R. L. Lockwood, of the division of simplified practice.

Various members of the conference also spoke on the individual work that has been done with their respective firms and concerns in developing the use of skid platforms and lift trucks.

The conference adopted the following resolution:

Whereas elimination of waste and reduction in the cost of distribution are highly desirable, and whereas the Department of Commerce, through the Bureau of Foreign and Domestic Commerce and the Bureau of Standards, has called this conference at the suggestion of representative shippers and transportation agencies for the purpose of undertaking to reduce further the high cost of handling and distributing commodities in general commerce: Be it hereby

Resolved, That these here present indorse the general idea as a practical and worth-while undertaking; and

Resolved further, That a committee shall be appointed to have general

charge of this undertaking, and that the Department of Commerce be requested to cooperate with that committee; and

Resolved further, That the members of the committee authorized by the previous resolution be empowered to appoint subcommittees to deal with the various phases of material handling methods; and

Resolved further, That the first effort toward reducing the cost of handling commodities in distribution be directed toward bringing about interchangeability of skid and lift truck equipment.

The following membership of the committee authorized in the above resolution has been announced by the Department of Commerce: A. H. Campbell, general traffic manager of the International Paper Co.; M. L. Hamaker, of the Joseph Dick Manufacturing Co.; J. A. Germonprez, of the Hupp Motor Car Corporation; Robert A. Lesher, traffic engineer, Port of New York Authority; W. S. Morehead, of the Illinois Central System; George B. Wright, of the Detroit & Cleveland Navigation Co.; F. R. Long, of the American Warehousemen's Association. Ex - officio members, Thomas E. Lyons, transportation division, Bureau of Foreign and Domestic Commerce, and R. L. Lockwood, division of simplified practice of the Bureau of Standards.

This committee is expected to meet after the summer months, at which time it will review progress then made and to suggest further activities to be undertaken. During the intervening period all suggestions received by members of the committee may be referred to the ex-officio members representing the two bureaus of the Department of Commerce.

## MECHANICS' LIEN ACT COMMITTEE

A joint meeting of this committee with the mechanics' lien act committee of the National Conference of Commissioners on Uniform State Laws was held on April 25 last. At that meeting some minor revisions were made at several points in the act, and a considerable modification of sections 5 and 6 was tentatively adopted. Ten thousand copies of a four-page leaflet containing this modification were printed by the committee. Approximately 7,800 copies of the second tentative draft and an equal number of copies of the supplement have been distributed among individuals and organizations interested in the subject. Suggestions are being received and compiled for consideration by the committee at the next meeting.

There is some advocacy of including in the uniform act a provision whereby the owner may exact from the contractor a bond conditioned for the payment of all accounts, which bond would have the effect of suspending the operation of the lien law on that particular property. The secretary has been collecting data regarding such provisions in existing laws and is discussing with representatives of surety companies the difficulties which may arise if such a provision were generally adopted.

## NEW PUBLICATIONS

Additions to Supplementary List of Publications of the Bureau of Standards (beginning July 1, 1927)

### Technologic Papers[1]

T 368 Bureau of Standards soil-corrosion studies, I. Soils, materials, and results of early observations; K. H. Logan, S. P. Ewing, and C. D. Yeomans. Price, 50 cents.

### Technical News Bulletin[1]

TNB 135. Technical News Bulletin, July, 1928.

### OUTSIDE PUBLICATIONS[2]

An automatic recorder for measuring the strength of radio signals and atmospheric disturbances. E. B. Judson; Proceedings, Institute of Radio Engineers (New York, N. Y.), p. 666; May, 1928.

---

[1] Send orders for publications under this heading, with remittance, only to Superintendent of Documents, Government Printing Office, Washington, D. C. Subscriptions to Technical News Bulletin, 25 cents per year (United States, Canada, and Mexico), 40 cents (foreign).

[2] "Outside publications" are not for distribution or sale by the Government. Request should be sent direct to publishers.

Annual report of committee on electrochemistry and electrometallurgy. G. W. Vinal, chairman; American Institute of Electrical Engineers (New York, N. Y.), Preprint of paper presented before summer convention; June 25 to 29, 1928.

Thermal expansion of beryllium and aluminum-beryllium alloys. P. Hidnert and W. T. Sweeney; Metal Industry (London, England), Vol. 32, p. 397, April 20, 1928; and pp. 423, April 27, 1928.

Accelerated tests of organic protective coatings. P. H. Walker and E. F. Hickson; Industrial and Engineering Chemistry (Washington, D. C.), Vol. 20, No. 6, p. 591; June, 1928.

Notes on Helianthus Argophyllus. K. S. Markley and W. T. Schreiber; Industrial and Engineering Chemistry (Washington, D. C.), Vol. 20, p. 636; June, 1928.

Fading of dyed textiles in light transmitted by various glasses. W. D. Appel and W. C. Smith; American Dyestuff Reporter (New York, N. Y.), Vol. 17, p. 410; June 25, 1928.

The Whittemore strain gauge. H. S. Whittemore; Instruments (Pittsburgh, Pa.), Vol. 1, No. 6, p. 299; June, 1928.

Control for welding. H. L. Whittemore; Journal, American Welding Society (New York, N. Y.), Vol. 7, No. 6, p. 52; June, 1928.

Results with testers for measuring tensile strength of paper. R. E. Lofton and L. W. Snyder; Paper Trade Journal (New York, N. Y.), Vol. 86, No. 24, p. 63; June, 1928.

Manufacture of wallboard from cornstalks. W. E. Emley; New York Herald-Tribune (New York, N. Y.), June 10, 1928.

The uses of glue in the paper industry. G. K. Hamill; A handbook based on work done at the Bureau of Standards. Published by the Glue Research Corporation, 1457 Broadway, New York, N. Y.; June, 1928.

Annual meeting of the British Institute of Metals. Abstract by H. S. Rawdon; Mining and Metallurgy (New York, N. Y.), Vol. 9, p. 278; June, 1928.

Wear and mechanical tests of some railroad bearing bronzes. H. J. French; American Society for Testing Materials (Philadelphia, Pa.), Preprint No. 340; June, 1928.

Fatigue resistance of rail steel. J. R. Freeman, jr.; Iron Age (New York, N. Y.), Vol. 121, p. 1743; 1928.

Safe loads for steels working at high temperatures. H. J. French, H. C. Cross, and A. A. Peterson; Iron Age (New York, N. Y.), Vol. 121, p. 1749; 1928.

Effect of strength of brick on compressive strength of brick masonry. J. W. McBurney; American Society for Testing Materials (Philadelphia, Pa.), Preprint No. 68; June, 1928.

What is an atom? Paul R. Heyl; Scientific American (New York, N. Y.), Vol. 139, No. 1, p. 9; July, 1928.

The following articles were published in the series on "Federal Cooperation with the States," in the United States Daily (Washington, D. C.):

George K. Burgess. Bureau of Standards aids States and cities to insure accuracy of weights and measures; June 12.

A. S. McAllister. States and municipalities are aided in testing quality of commodities brought for public use; June 13.

M. D. Hersey. Comparative efficiency of lubricants studied to conserve energy developed by machinery; June 14.

E. R. Weaver. Studies by Bureau of Standards used as basis for State regulation of public utility service; June 15.

M. G. Lloyd. Safety codes drafted as basis for State laws for prevention of accidents; June 16.

U. S. GOVERNMENT PRINTING OFFICE: 1928